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the curve of intensities becoming, in that case, very nearly a right line passing through the centre of the magnet.

Employing then this approximate formula, we have

$$M = \tfrac{2}{3} m' l^2; \quad M_3 = \tfrac{2}{5} m' l^4.$$

The ratio of these quantities is $\frac{M_3}{M} = \frac{3}{5} l^2$, a value independent of m'; and substituting in the expression of h above given, and designating the half lengths of the deflecting and of the suspended magnets by l and l', respectively,

$$h = \tfrac{3}{5} (2l^2 - 3l'^2);$$

an expression whose value may be exactly known, independently of experiment. This value vanishes, when $l^2 = \frac{3}{2} l'^2$, or

$$l = 1{\cdot}224\, l';$$

and in this case, therefore, the quantity sought is given by the simple formula

$$Q = D^3 \tan u.$$

The author concluded his paper with an account of a series of deflection experiments, instituted for the purpose of confirming these results. The magnets employed were cylindrical, their lengths being 3 inches and 3⅔ inches, and their diameter 3–10ths of an inch. The observations were made with every precaution necessary to insure exactness, and at times when the fluctuations in the direction and intensity of the magnetic force were very small; and their results verify the conclusions above obtained, as applied to the case of small magnets.

Dr. Apjohn next read the following letter, which he had received from Captain Boileau, superintendent of the Magnetic Observatory at Simla, in India.

" *Simla, March*, 7, 1842.

" My dear Sir,

" I have the pleasure of forwarding to you, through the Government of India, a complete set of hygrometric tables, computed by my assistant, from your last formula, to which I have added a vapour table, computed by Biot's formula, from Dalton's experiments, which is the same that Pouillet has used in the last edition of his *Traité de Physique*, that I have seen. Every one of the numerical values in this table (No. 3) has been computed directly from the formula to seven places of decimals, five of which only have been retained. In like manner, in part 1, each of the numerical values for depressions to one-tenth of a degree Fahrenheit, has been directly computed for twenty and for thirty inches of pressure, and the intermediate values obtained by addition. All the work has been checked by differences, and examined by three separate computors.

" Accompanying, are also sent the separate observations of the wet and dry bulb thermometers, of Daniell's hygrometer, and of the standard barometer, with notice of the weather for the twelve term days of 1841, which have been taken specially for your own use, and which you will, I think, find to confirm the views you had already taken upon the subject. There is one point which strikes at first sight, viz., that with very few exceptions, the dew-point, by the hygrometer, is too high. It is a difficult instrument to use. It requires the observer to approach near to it; and, even with the utmost care, it is difficult to prevent an effect sensible at times to a prejudicial extent, upon the hygrometric condition of the surrounding air. None of these difficulties occur with the wet and dry thermometers, which have one still greater advantage, viz., the ease with which the wet ball can, under almost any circumstances, be moistened.

" During several months, we observed the hygrometer hourly on term days, but finding that this gave much trouble, and was likely to prejudice the readings of the magnetometer, I discontinued the practice, and had since but one observation every two hours.

During this year, I regret to say, that a failure in ether has prevented any readings on either January or February term days, and of a supply of five pints just had up under order of Government, nearly three and a-half pints have evaporated on the journey. So much for an Indian climate, and bottles not hermetically sealed. You will oblige me by acknowledging the receipt of this packet, either through our mutual friend Professor Lloyd, or through the Military Secretary at the East India House, Philip Melvill, Esq.; and if you wish me to alter the system adopted, you have only to say so, and I will endeavour to meet your views. I hope to continue the regular series from this month again without interruption.

"Believe me to remain, with kind regards,
"My dear Sir,
"Yours very truly,
"S. Boileau.

"P. S.—You can make any use of the accompanying document you may please to do."

Dr. Apjohn then observed, that availing himself of the permission given him by Captain Boileau, he would make a few remarks upon the hygrometric observations made on the magnetic term days for 1841. These observations were highly interesting to meteorologists, having been made by an officer of great scientific attainments, of extensive experience as an observer, and with the aid of first-rate instruments: but his (Dr. Apjohn's) reason for considering them particularly important was, that they furnished the means of estimating the relative merits of the two hygrometric processes at present in use, viz., that according to which, the dewpoint is directly got by the aid of Mr. Daniell's instrument, and that which conducts to the same conclusion through the application of the well known formula,

$$f'' = f' - ,01147\,(t - t') \times \frac{p - f'}{30}$$

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[*] In this expression f' is the force of vapour at dew-point, f' the force of

to the temperatures indicated by a wet and dry thermometer.

The observations for the April term day, were those to which it was his intention to advert, as they exhibited higher values for $t—t'$, than those made in any other month. Now upon looking through these which amount to 24, the first fact which at once presents itself is, that in every instance but *two*, the observed dew-points are higher than obtained by the formula, and in some instances, by as many as nine degrees Fahrenheit. One or other series, therefore, must be erroneous. That the observed dew-points are inaccurate, Dr. Apjohn inferred, on the ground of their being inconsistent with each other; for he held it as quite certain, whether the hygrometric expression be correct or not, that when in the case of any two distinct observations, t and t' have the same values, that upon both such occasions the air includes the same amount of moisture, or has the same dew-point. Tried by such a criterion, the results obtained with Daniell's instrument are defective, as is well illustrated by the following extract from the April observations.

	t	t'	t'' *ob.*	t'' *calc.*		
10	70	51	43.5	34.7	9.5	1.4
11	71.2	51	34	33.3		
7	63	47	31	31.6	6.6	1.2
17	62	47	36.6	32.8		
2	55	42.5	30.5	28.9	2.5	0.9
24	55	42.2	33	28		

From what has been just said, it is obvious, that observations 10 and 11 should give nearly the same dew-point. This is true of the dew points got by the formula, but not at all of the direct determinations by the hygrometer, as those

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vapour at t', the temperature by the wet thermometer, and t the temperature of the air.

differ 9°.5. In 7 and 17, the dew-points are necessarily nearly the same. The results got by the formula differ by only 1°.2, while the instrumental ones differ by 6°.6. Again, 2 and 24 should give g.p. the same dew-point. This is true of the formula, but not at all of the hygrometer, as the temperatures it yields differ by 2°.5. The preceding instances, the number of which might be greatly augmented, were, Dr. Apjohn conceived, quite sufficient to show, that even in the hands of Captain Boileau, Daniell's instrument has not given correct conclusions; and that, therefore, generally it cannot be relied upon for determining, accurately, the hygrometric relations of the atmosphere.

With respect to the column of results obtained by Captain Boileau, from the wet bulb process, Dr. Apjohn could not entertain the slightest doubt of their exactness, having found that his formula stood the severest experimental tests to which he could subject it. These experiments, however, (see Transactions Royal Irish Academy, vol. vi.) were, he admitted, all made under pressures, at or about 30: and hence it always appeared to him desirable, that they should be repeated at such diminished pressures, as are met with at elevated points on the earth's surface. In this point of view, the Simla observations appeared at first highly important, the pressure there being but little over 23; but as no reliance can be placed on the dew-points directly got, they cannot be used to test the accuracy of the hygrometric expression.

Dr. Apjohn then expressed a hope, that no one who heard him would misunderstand him to assert, that the dew-point could not be accurately got by Daniell's instrument. He knew it could, and he had explained elsewhere how to use it, so as to arrive at a correct result. What he had, however, asserted before, and would again repeat, was, first, that it was an instrument very difficult to observe accurately with; and second, that when Mr. Daniell's rule is attended to, namely, to take as dew-point, the mean of the temperatures indicated by the inner thermometer at the instant of the deposition of the dew, and at that of its disappearance, the result is necessarily higher than the truth.

Dr. Apjohn concluded, by drawing attention to the great value of the other tables alluded to in Captain Boileau's letter, the construction of which, must have been a work of immense labour. Two of these greatly simplify the calculations necessary in applying the hygrometric formula, as the arithmetical operations are thereby reduced to mere addition and subtraction.

The third table gives the force of vapour to tenths of a degree Fahrenheit, throughout the entire range included between —3° and + 146, Fahrenheit, calculated *de novo* by the well known method of Biot, from the experiments of Dalton and Ure. It does not materially differ, except in its greater extent and minuteness, from the table of the tension of aqueous vapour which Dr. Apjohn has hitherto used, and the superior accuracy of which, as compared with the table of Kaemtz, and that not long since published by the Meteorological Committee of the Royal Society, has been rendered highly probable by Professor Lloyd.

Professor Mac Cullagh read a paper on the Catalogue of Egyptian Kings, which is usually known by the name of the *Laterculum* of Eratosthenes.

This Catalogue, which the distinguished mathematician and philosopher whose name it bears drew up by command of Ptolemy Euergetes, contains a long series of kings who reigned at Thebes in Upper Egypt; and has been preserved to us in the *Chronographia* of Georgius Syncellus, a Greek monk of the eighth century. It is a document which has been made much use of by chronologers; by some of whom, as by Sir John Marsham for example, who calls it "*venerandissimum antiquitatis monumentum,*" it has been reckoned of the very highest authority; but it is extremely